Apprenticeship and Industry Training

Insulator

Apprenticeship Course Outline

3307 (2007)

Alberta

Apprenticeship and Industry Training

ALBERTA ADVANCED EDUCATION AND TECHNOLOGY CATALOGUING IN PUBLICATION DATA

Alberta. Alberta Advanced Education and Technology. Apprenticeship and Industry Training.
Insulator apprenticeship course outline.

ISBN 978-0-7785-6388-4

1. Insulation (Heat) – Study and teaching – Alberta. 2. Apprenticeship programs – Alberta. 3. Apprentices – Alberta. 4. Occupational training – Alberta. I. Title.

HD4885.C2.I57.A333 2007 373.27

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Insulator
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Course Outline

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Apprenticeship

Apprenticeship is post-secondary education with a difference. Apprenticeship begins with finding an employer. Employers hire apprentices, pay their wages and provide on-the-job training and work experience. Approximately 80 per cent of an apprentice's time is spent on the job under the supervision of a certified journeyperson or qualified tradesperson. The other 20 per cent involves technical training provided at, or through, a post-secondary institution – usually a college or technical institute.

To become certified journeypersons, apprentices must learn theory and skills, and they must pass examinations. Requirements for certification—including the content and delivery of technical training—are developed and updated by the Alberta Apprenticeship and Industry Training Board on the recommendation of Insulator Provincial Apprenticeship Committee.

The graduate of the Insulator apprenticeship program is a certified journeyperson who will be able:

- responsibly do all work tasks expected of a journeyperson
- supervise, train and coach apprentices
- demonstrate the installation, fitting, fabrication and attachment of insulation, finishing and weatherproofing materials to a high standard of workmanship
- use efficiently and safely all hand and power operated equipment used by the insulation industry
- read and correctly interpret blueprints, specifications and building codes
- thoroughly describe insulation materials and their uses
- describe all systems requiring insulation
- co-ordinate insulation work with other trades on the job site
- comply with all safety regulations of the construction industry
- perform assigned tasks in accordance with quality and production standards required by industry

Apprenticeship and Industry Training System

Industry-Driven

Alberta's apprenticeship and industry training system is an industry-driven system that ensures a highly skilled, internationally competitive workforce in more than 50 designated trades and occupations. This workforce supports the economic progress of Alberta and its competitive role in the global market. Industry (employers and employees) establishes training and certification standards and provides direction to the system through an industry committee network and the Alberta Apprenticeship and Industry Training Board. The Alberta government provides the legislative framework and administrative support for the apprenticeship and industry training system.

Alberta Apprenticeship and Industry Training Board

The Alberta Apprenticeship and Industry Training Board provides a leadership role in developing Alberta's highly skilled and trained workforce. The board's primary responsibility is to establish the standards and requirements for training and certification in programs under the Apprenticeship and Industry Training Act. The board also provides advice to the Minister of Advanced Education and Technology on the needs of Alberta's labour market for skilled and trained workers, and the designation of trades and occupations.

The thirteen-member board consists of a chair, eight members representing trades and four members representing other industries. There are equal numbers of employer and employee representatives.

Industry Committee Network

Alberta's apprenticeship and industry training system relies on a network of industry committees, including local and provincial apprenticeship committees in the designated trades, and occupational committees in the designated occupations. The network also includes other committees such as provisional committees that are established before the designation of a new trade or occupation comes into effect. All trade committees are composed of equal numbers of employer and employee representatives. The industry committee network is the foundation of Alberta's apprenticeship and industry training system.

Local Apprenticeship Committees (LAC)

Wherever there is activity in a trade, the board can set up a local apprenticeship committee. The board appoints equal numbers of employee and employer representatives for terms of up to three years. The committee appoints a member as presiding officer. Local apprenticeship committees:

- monitor apprenticeship programs and the progress of apprentices in their trade, at the local level
- make recommendations to their trade's provincial apprenticeship committee (PAC) about apprenticeship and certification in their trade
- promote apprenticeship programs and training and the pursuit of careers in their trade
- make recommendations to the board about the appointment of members to their trade's PAC
- help settle certain kinds of disagreements between apprentices and their employers
- carry out functions assigned by their trade's PAC or the board

Provincial Apprenticeship Committees (PAC)

The board establishes a provincial apprenticeship committee for each trade. It appoints an equal number of employer and employee representatives, and, on the PAC's recommendation, a presiding officer - each for a maximum of two terms of up to three years. Most PACs have nine members but can have as many as twenty-one. Provincial apprenticeship committees:

- Make recommendations to the board about:
  - standards and requirements for training and certification in their trade
  - courses and examinations in their trade
  - apprenticeship and certification
  - designation of trades and occupations
  - regulations and orders under the Apprenticeship and Industry Training Act
- monitor the activities of local apprenticeship committees in their trade
- determine whether training of various kinds is equivalent to training provided in an apprenticeship program in their trade
- promote apprenticeship programs and training and the pursuit of careers in their trade
- consult with other committees under the Apprenticeship and Industry Training Act about apprenticeship programs, training and certification and facilitate cooperation between different trades and occupations
- consult with organizations, associations and people who have an interest in their trade and with employers and employees in their trade
- may participate in resolving certain disagreements between employers and employees
- carry out functions assigned by the board

Insulator PAC Members at the time of publication

Mr. R. Gravelle	Edmonton	Presiding Officer
Mr. G. Magat	Calgary	Employer
Mr. P. Pearson	Edmonton	Employer
Mr. R. Andrews	Fort McMurray	Employer
Mr. M. Trevors	Edmonton	Employer
Mr. B. Arnfinson	Edmonton	Employee
Mr. D. Farrus	Edmonton	Employee
Mr. L. Norlander	Edmonton	Employee
Mr. D. Paul	Red Deer	Employee

Alberta Government

Alberta Advanced Education and Technology works with industry, employer and employee organizations and technical training providers to:

- facilitate industry's development and maintenance of training and certification standards
- provide registration and counselling services to apprentices and employers
- coordinate technical training in collaboration with training providers
- certify apprentices and others who meet industry standards

Technical Institutes and Colleges

The technical institutes and colleges are key participants in Alberta's apprenticeship and industry training system. They work with the board, industry committees and Alberta Advanced Education and Technology to enhance access and responsiveness to industry needs through the delivery of the technical training component of apprenticeship programs. They develop lesson plans from the course outlines established by industry and provide technical training to apprentices.

Apprenticeship Safety

Safe working procedures and conditions, incident/injury prevention, and the preservation of health are of primary importance in apprenticeship programs in Alberta. These responsibilities are shared and require the joint efforts of government, employers, employees, apprentices and the public. Therefore, it is imperative that all parties are aware of circumstances that may lead to injury or harm.

Safe learning experiences and healthy environments can be created by controlling the variables and behaviours that may contribute to or cause an incident or injury. By practicing a safe and healthy attitude, everyone can enjoy the benefit of an incident and injury free environment.

Alberta Apprenticeship and Industry Training Board Safety Policy

The Alberta Apprenticeship and Industry Training Board fully supports safe learning and working environments and encourages the teaching of proper safety procedures both within trade specific training and in the workplace.

Trade specific safety training is an integral component of technical training, while ongoing or general non-trade specific safety training remains the responsibility of the employer and the employee as required under workplace health and safety legislation.

Workplace Responsibilities

The employer is responsible for:

- training employees and apprentices in the safe use and operation of equipment
- providing and maintaining safety equipment, protective devices and clothing
- enforcing safe working procedures
- providing safeguards for machinery, equipment and tools
- observing all accident prevention regulations

The employee and apprentice are responsible for:

- working in accordance with the safety regulations pertaining to the job environment
- working in such a way as not to endanger themselves, fellow employees or apprentices

Workplace Health and Safety

A tradesperson is often exposed to more hazards than any other person in the work force and therefore should be familiar with and apply the Occupational Health and Safety Act, Regulations and Code when dealing with personal safety and the special safety rules that apply to all daily tasks.

Workplace Health and Safety (Alberta Employment, Immigration and Industry) conducts periodic inspections of workplaces to ensure that safety regulations for industry are being observed.

Additional information is available at www.worksafely.org

Technical Training

Apprenticeship technical training is delivered by the technical institutes and many colleges in the public post-secondary system throughout Alberta. The colleges and institutes are committed to delivering the technical training component of Alberta apprenticeship programs in a safe, efficient and effective manner. All training providers place great emphasis on safe technical practices that complement safe workplace practices and help to develop a skilled, safe workforce.

The following institutions deliver Insulator apprenticeship technical training:

Northern Alberta Institute of Technology
(Main Campus)

Procedures for Recommending Revisions to the Course Outline

Advanced Education and Technology has prepared this course outline in partnership with the Insulator Provincial Apprenticeship Committee.

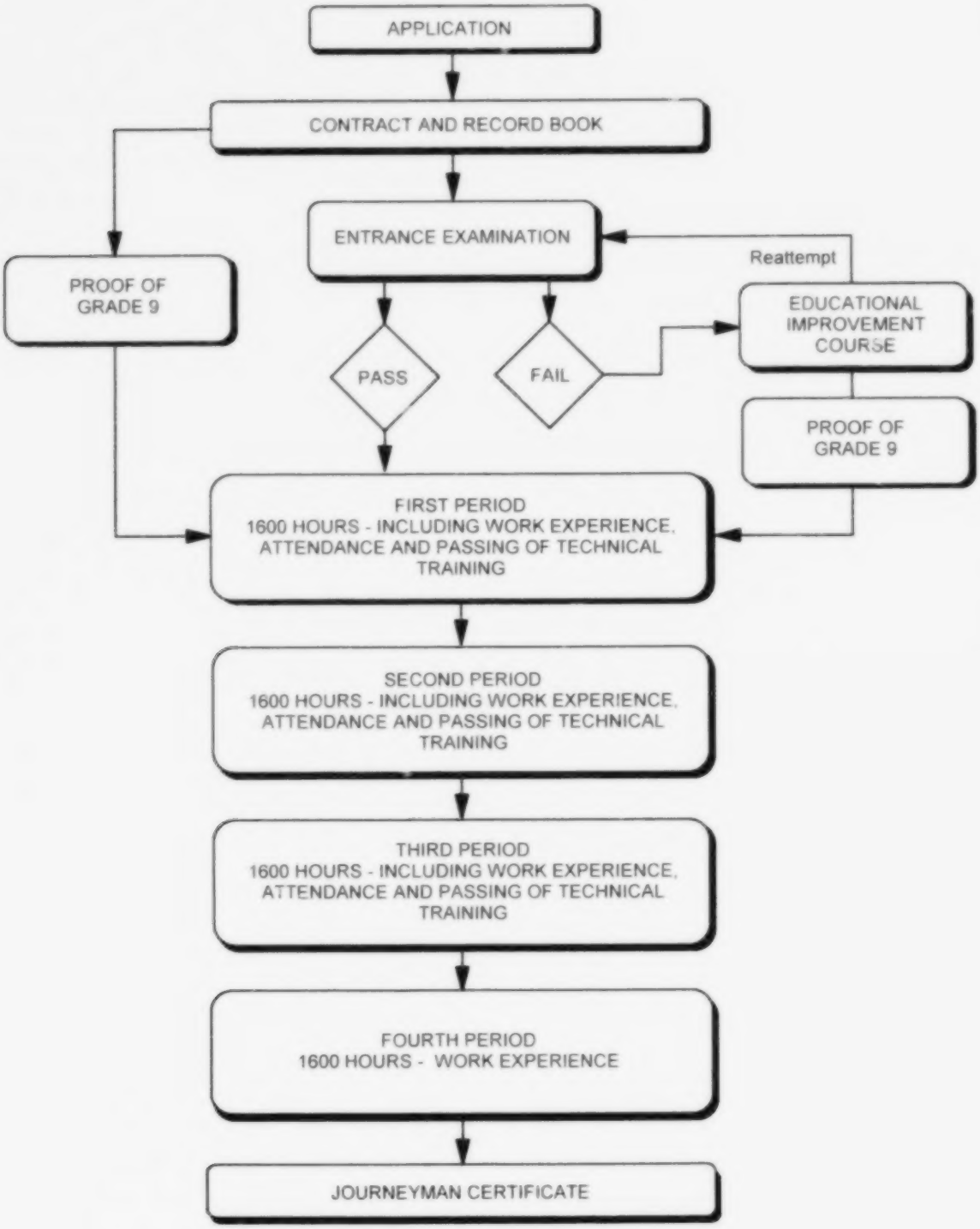
This course outline was approved on May 5, 2006 by the Alberta Apprenticeship and Industry Training Board on a recommendation from the Provincial Apprenticeship Committee. The valuable input provided by representatives of industry and the institutions that provide the technical training is acknowledged.

Any concerned individual or group in the province of Alberta may make recommendations for change by writing to:

Insulator Provincial Apprenticeship Committee
c/o Industry Programs and Standards
Apprenticeship and Industry Training
Advanced Education and Technology
10th floor, Commerce Place
10155 102 Street NW
Edmonton AB T5J 4L5

It is requested that recommendations for change refer to specific areas and state references used. Recommendations for change will be placed on the agenda for regular meetings of the Insulator Provincial Apprenticeship Committee.

Apprenticeship Route toward Certification


APPLICATION
CONTRACT AND RECORD BOOK
ENTRANCE EXAMINATION
PROOF OF GRADE 9
Reattempt
EDUCATIONAL IMPROVEMENT COURSE
PASS
FAIL
PROOF OF GRADE 9
FIRST PERIOD
1600 HOURS - INCLUDING WORK EXPERIENCE, ATTENDANCE AND PASSING OF TECHNICAL TRAINING
SECOND PERIOD
1600 HOURS - INCLUDING WORK EXPERIENCE, ATTENDANCE AND PASSING OF TECHNICAL TRAINING
THIRD PERIOD
1600 HOURS - INCLUDING WORK EXPERIENCE, ATTENDANCE AND PASSING OF TECHNICAL TRAINING
FOURTH PERIOD
1600 HOURS - WORK EXPERIENCE
JOURNEYMAN CERTIFICATE

Insulator Training Profile
FIRST PERIOD
(6 Weeks 30 Hours per Week – Total of 180 Hours)

SECTION ONE

INTRODUCTION, ORIENTATION AND SAFETY REGULATIONS
10 HOURS

A	B	C
Apprenticeship and Industry Training Orientation and Regulations 3 Hours	WHMIS, OH&S Regulations, and Safety 5 Hours	K Factor and Pipe Sizes 2 Hours

SECTION TWO

INSULATION MATERIALS AND ITS APPLICATION
84 HOURS

A	B	C
Types of Insulation 2 Hours	Fiberglass Pipe Covering 12 Hours	Fiberglass Rigid and Flex Duct Insulation 16 Hours
D	**E**	**F**
Acoustic Insulation 8 Hours	Foamglas® & Pittwrap® 10 Hours	Mineral Wool 8 Hours
G	**H**	**I**
Calcium Silicate and Ceramic Fibers 10 Hours	Extruded Foam Plastic 8 Hours	Polystyrenes and Polyurethanes 10 Hours

SECTION THREE

INSULATION ACCESSORIES, TOOLS AND EQUIPMENT
32 HOURS

A	B	C
Mastics and Cements 10 Hours	Miters 6 Hours	Metal Mesh, Wire and Bands 6 Hours
D	**E**	
Hand and Power Tools 8 Hours	Material Handling 2 Hours	

SECTION FOUR

ASBESTOS
18 HOURS

A	B	C
Asbestos History and Types 2 Hours	Methods of Control, Health Effects, and Respirators 6 Hours	Site Preparation, Equipment, and Disposal 6 Hours
D		
OH&S Regulations and Exams 4 Hours		

SECTION FIVE

TRADE MATHEMATICS
18 HOURS

A	B	C
Whole Numbers 2 Hours	Fractions and Decimals 4 Hours	Conversions and Percentages 5 Hours
D	**E**	**F**
Perimeters and Areas 3 Hours	Band Spacing 2 Hours	Board Feet 2 Hours

SECTION SIX

BLUEPRINT READING AND PATTERN DEVELOPMENT
18 HOURS

A	B	C
Lines, Scale Rulers and Symbols 6 Hours	Pictorial and Orthographic Drawings 6 Hours	Divisions of Blueprints and Print Assessment 6 Hours

SECOND PERIOD
(6 Weeks 30 Hours per Week – Total of 180 Hours)

SECTION ONE

SAFETY, NOISE CONTROL, AND EXPOSURE TO HEAT AND COLD
10 HOURS

A	B
Safety and Noise Control 8 Hours	Exposure to Heat and Cold 2 Hours

SECTION TWO

CANVAS ON PIPING, DUCTS AND EQUIPMENT
48 HOURS

A	B	C
Applications and Surface Preparation 13 Hours	Practical Application 33 Hours	Stud Welders 2 Hours

SECTION THREE

POLY VINYL CHLORIDE PIPE
20 HOURS

A	B	C
Applications 6 Hours	Surface Preparation 2 Hours	Practical Application 12 Hours

SECTION FOUR

LAGS AND PREFAB FITTINGS
24 HOURS

A	B	C
Theory of Application 8 Hours	Adhesives, Mastics and Equipment Set-Up 4 Hours	Practical Application 12 Hours

SECTION FIVE

INTRODUCTION TO METALS
28 HOURS

A	B	C
Line and Circle Division 4 Hours	Shop Equipment and Layout Tools 6 Hours	Bevels 6 Hours

D	E
Equal and Unequal Tees 6 Hours	End Caps 6 Hours

SECTION SIX

MISCELLANEOUS APPLICATIONS
8 HOURS

A	B	C
Underground Systems 2 Hours	Breechings 2 Hours	Expansion Joints 2 Hours

D
Fireproofing / Firestopping 2 Hours

SECTION SEVEN

TRADE MATHEMATICS
18 HOURS

A	B	C
Trade Problems 4 Hours	Insulation on Ducts and Band Spacing 6 Hours	Lags 4 Hours

D
Metal and Canvas on Ducts 4 Hours

SECTION EIGHT

BLUEPRINT READING AND PATTERN DEVELOPMENT
24 HOURS

A	B	C
Orthographic Drawings 6 Hours	Commercial and Industrial Systems 4 Hours	Specifications and Addendums 8 Hours

D
Mechanical Drawings and Symbols 6 Hours

THIRD PERIOD
(8 Weeks 30 Hours per Week – Total of 240 Hours)

SECTION ONE

SAFETY, TOOLS AND CODES
12 HOURS

A	B	C
Regulations and Building Codes 4 Hours	Hand and Power Tool Use and Safety 6 Hours	Heat Loss Detection 2 Hours

SECTION TWO

METAL FABRICATION
12 HOURS

A	B	C
Pattern Development and Line and Circle Division 4 Hours	Schedules of Metal, Fasteners, and Pipe Sizes 6 Hours	K Factor 2 Hours

SECTION THREE

EQUIPMENT LAYOUT
84 HOURS

A	B	C
Spherical and Elliptical Heads 12 Hours	Box Coverings 2 Hours	Concentric Reducers 10 Hours

D	E
Eccentric Reducers 10 Hours	Transitions 50 Hours

SECTION FOUR

PIPE RACK LAYOUT
70 HOURS

A	B	C
Bevels 10 Hours	End Caps 10 Hours	Equal and Unequal Tees 20 Hours

D	E	F
Gore and Butterfly Elbows 14 Hours	Laterals 10 Hours	Removable Covers 6 Hours

SECTION FIVE

EXTRUDED FOAM PATTERN DEVELOPMENT
14 HOURS

A	B	C
Extruded Foam Concepts 2 Hours	Elbows 4 Hours	Reducers and Reducing Elbows 8 Hours

SECTION SIX

TRADE MATHEMATICS
16 HOURS

A	B	C
Trade Problems 4 Hours	Insulation on Ducts and Band Spacing 4 Hours	Lags 4 Hours

D
Metal and Canvas on Ducts 4 Hours

SECTION SEVEN

BLUEPRINT READING AND PATTERN DEVELOPMENT
32 HOURS

A	B	C
Blueprint Reading and Material Take Offs 6 Hours	Commercial and Industrial Systems 11 Hours	Specifications 4 Hours

D
Estimating 11 Hours

NOTE: The hours stated are for guidance and should be adhered to as closely as possible. However, adjustments must be made for rate of apprentice learning, statutory holidays, registration and examinations for the training establishment and Apprenticeship and Industry Training.

FIRST PERIOD TECHNICAL TRAINING
INSULATOR TRADE
COURSE OUTLINE

UPON SUCCESSFUL COMPLETION OF THIS PROGRAM THE APPRENTICE SHOULD BE ABLE TO PERFORM THE FOLLOWING OUTCOMES AND OBJECTIVES.

SECTION ONE: ..... INTRODUCTION, ORIENTATION AND SAFETY REGULATIONS ..... 10 HOURS

A. Apprenticeship and Industry Training Orientation and Regulations ..... 3 Hours

Outcome: ***Describe the Alberta Apprenticeship Training System and its regulations.***

1. Identify the training profile of the Insulator Apprenticeship in Alberta.
2. Explain the Insulator program course outline learning outcomes and objectives.
3. Describe the responsibilities for the Contract of Apprenticeship by the apprentice, employer and Alberta Apprenticeship and Industry Training.
4. Identify industrial, commercial and construction fields that provide opportunities for Insulators.
5. Discuss the contents of the apprenticeship training Record Book.
6. Briefly outline the history and the scope of the Insulator trade.
7. Review the history of Insulation and its uses.
8. Describe initial uses of insulation on piping systems.

B. WHMIS, OH&S Regulations, and Safety ..... 5 Hours

Outcome: ***Describe what WHMIS is and demonstrate workshop safety as it pertains to Occupational Health and Safety Standards.***

1. Explain the WHMIS program and its applications:
   a) types of labels
   b) product classification
   c) material safety data sheet (MSDS)
   d) education and training
2. Recognize important areas of the Occupational Health and Safety Act in general terms:
   a) obligations of employers and employees
   b) authority of inspectors to inspect work and stop work
   c) existence of imminent danger
3. Occupational Exposure Limits (O.E.L.'s) and control measures for trade products.
4. Identify the Safety Regulations as they apply to safe work practices in the Insulator and related trades with emphasis on:
   a) identification of known safety hazards, such as chemicals and gases
   b) maintenance of equipment
   c) housekeeping, personal protective equipment and clothing
   d) falling hazards
   e) grinding, abrasive cut-off wheels and eye protection
   f) use of safeguards
   g) ladders
   h) scaffolds, planking and power operated lifts
   i) fall arrest system

C. K Factor and Pipe Sizes ..... 2 Hours

Outcome: ***Define K Factor of insulation and identify the different pipe sizes.***

1. Identify and list the purposes of the K factor of insulation.
2. Identify and describe the applications of pipe sizes used in the Insulator trade.
3. Demonstrate the use of pipe sizes used in the Insulator trade.

SECTION TWO: ..... INSULATION MATERIALS AND ITS APPLICATION ..... 84 HOURS

A. Types of Insulation ..... 2 Hours

Outcome: ***Identify the types of insulation in the insulator trade.***

1. Identify and list the classes of insulation used in the Insulator trade.
2. Describe the types of insulation used in the trade.
3. Demonstrate the ability to select and use fasteners.
4. Demonstrate the use of heat tracer coverings.
5. Demonstrate skill in the application of any new products developed for industry.
6. Demonstrate the application of reinforcing fabrics.

B. Fiberglass Pipe Covering ..... 12 Hours

Outcome: ***Identify and demonstrate the proper use of and applications that require fiberglass pipe coverings.***

1. Identify and list the purposes of fiberglass pipe coverings.
2. Demonstrate the application of fiberglass pipe coverings.
3. Demonstrate the application of fiberglass wrap around insulation.

C. Fiberglass Rigid and Flex Duct Insulation ..... 16 Hours

Outcome: ***Identify applications that require rigid and flex duct fiberglass and demonstrate its proper use and installation.***

1. Identify and list the purposes of fiberglass:
   a) rigid duct Insulation
   b) flex duct insulation
2. Demonstrate the application of:
   a) fiberglass rigid duct Insulation
   b) fiberglass flex duct insulation
3. Demonstrate the application of fiberglass board insulation.

D. Acoustic Insulation ..... 8 Hours

Outcome: ***Identify applications that require acoustic fiberglass insulation and demonstrate its proper use and installation.***

1. Identify and list the purposes of acoustic insulation:
   a) fiberglass
   b) mineral wool
2. Demonstrate the application of acoustic insulation.

3. List materials used for acoustic noise control:
   a) fiberglass
   b) mineral wool
4. Outline methods and procedures for application of acoustic noise control.

E. Foamglas® and Pittwrap® .....10 Hours

Outcome: ***Identify applications that require Foamglas® and Pittwrap® insulation and demonstrate its proper use and installation.***

1. Identify and list the purpose of Foamglas®.
2. Demonstrate the application of Foamglas®.
3. Identify and list the purpose of Pittwrap®.
4. Demonstrate the application of Pittwrap®.
5. Identify prevalent health risks associated when working with Foamglas® and Pittwrap®.

F. Mineral Wool.....8 Hours

Outcome: ***Identify applications that require mineral wool and demonstrate its proper use and application.***

1. Identify and list the purposes of mineral wool.
2. Demonstrate the application of mineral wool.
3. Identify prevalent health risks associated when working with mineral wool.

G. Calcium Silicate and Ceramic Fibers .....10 Hours

Outcome: ***Identify applications that require calcium silicate and ceramic fibers and demonstrate its proper use and application.***

1. Identify and list the purposes of calcium silicate.
2. Demonstrate the application of calcium silicate.
3. Identify and list the applications of ceramic fibers.
4. Demonstrate the application of ceramic fibers.
5. Identify prevalent health risks associated when working with calcium silicate and ceramic fibers.

H. Extruded Foam Plastic .....8 Hours

Outcome: ***Identify applications that require foam plastic and demonstrate its proper use and application.***

1. Identify and list the applications of extruded foam plastic insulation.
2. Demonstrate the application of extruded foam plastic.

I. Polystyrenes and Polyurethanes .....10 Hours

Outcome: ***Identify applications that require polystyrenes and polyurethanes and demonstrate its proper use and applications.***

1. Identify and list the applications of polystyrenes.
2. Demonstrate the application of polystyrenes.
3. Identify and list the applications of polyurethanes.
4. Demonstrate the application of polyurethanes.
5. Identify prevalent health risks associated when working with polystyrenes and polyurethanes.

SECTION THREE: .....INSULATION ACCESSORIES, TOOLS, AND EQUIPMENT.....32 HOURS

A. Mastics and Cements .....10 Hours

Outcome: ***Demonstrate the ability to prepare surfaces and apply cements and mastics.***

1. Identify and describe:
   a) mastic type vapour barriers
   b) jacketing vapour barriers
   c) adhesives and sealers
2. Demonstrate the proper application of mastics.
3. Demonstrate proper application of:
   a) vapour barriers
   b) weather proofing
4. Demonstrate an ability to apply cements.
5. Demonstrate the proper mix and application of:
   a) paste powder
   b) lagging adhesives
   c) contact adhesives
   d) non-contact adhesives
   e) fibrous adhesives

B. Miters.....6 Hours

Outcome: ***Identify the different types of miter joints and perform precise miter cuts.***

1. Identify various systems requiring fabricated insulation:
   a) piping
   b) duct
   c) equipment
   d) fittings
2. Demonstrate the ability to make precise miter joints for:
   a) piping
   b) duct
   c) equipment
   d) fittings

C. Metal Mesh, Wire, and Bands ..... 6 Hours

Outcome: ***Demonstrate the correct use of metal mesh, wire, and bands common to the trade.***

1. Outline correct preparation and application procedures for metal mesh and wire.
2. Demonstrate correct preparation, fabrication and application procedures of metal mesh and wire.
3. Identify common uses and applications of bands.
4. Demonstrate the application and placing of bands.

D. Hand and Power Tools ..... 8 Hours

Outcome: ***Select, use and maintain hand and power tools.***

1. Safely use and maintain:
   a) hand tools
   b) power tools
   c) equipment
2. Discuss tools with emphasis on names and working parts.
3. Discuss typical and occasional job applications.
4. Recognize the components, assembly, types, sizes, and the care, maintenance, and safe use of:
   a) measuring tools
   b) layout tools
   c) cutting tools
   d) metal cutting tools
   e) crimping and riveting tools
   f) spirit and hydro leveling tools
   g) bending and tying tools
   h) impact tools
   i) screw driving tools
   j) sharpening tools
   k) power extension cords and polarity plugs
   l) caulking tools
   m) laser instruments

E. Material Handling ..... 2 Hours

Outcome: ***Demonstrate the correct method of handling materials common to the trade.***

1. Identify and describe applications of material handling.
2. Demonstrate methods of the proper handling of material:
   a) handling heavy materials
   b) handling of trade products
3. State the uses, advantages, disadvantages, and comparative costs of materials.

SECTION FOUR: ..... ASBESTOS ..... 18 HOURS

A. Asbestos History and Types ..... 2 Hours

Outcome: ***Identify the different types of asbestos and their origins.***

1. Describe asbestos awareness in the insulation industry.
2. List the different types of asbestos.
3. List the different types of materials containing asbestos.

B. Methods of Control, Health Effects, and Respirators ..... 6 Hours

Outcome: ***Describe diseases, containment and demonstrate worksite safety as it pertains to the abatement of asbestos.***

1. Describe asbestos related diseases.
2. Describe methods of asbestos abatement in the industry:
   a) encapsulation
   b) enclosures
   c) removal
3. List equipment, materials, safety accessories, and procedures used for asbestos control:
   a) respirators
   b) protective clothing
   c) spray equipment
   d) H.E.P.A. vacuum cleaners
   e) negative air filter units
   f) glove bags
   g) removal tools
   h) vacuum trucks

C. Site Preparation, Equipment, and Disposal ..... 6 Hours

Outcome: ***Demonstrate awareness for site preparation, equipment used to remove asbestos and the disposal of asbestos materials.***

1. Demonstrate the use of asbestos removal equipment:
   a) respirators
   b) protective clothing
   c) spray equipment
   d) H.E.P.A. vacuum cleaners
   e) negative air filter units
   f) glove bags
   g) removal tools
2. List worksite planning procedures and safety:
   a) ventilation
   b) water
   c) isolating the work area
   d) negative air pressure
   e) emergency procedures
3. List clean-up procedures and final inspection practices.

D. OH&S Regulations and Exams ..... 4 Hours

Outcome: ***Demonstrate knowledge of OH&S regulations pertaining to the removal of asbestos and the ability to successfully complete the asbestos worker course as outlined in the Occupational Health and Safety Standards.***

1. Review OH&S. regulations relevant to asbestos removal:
   a) monitoring of work site
   b) exposure limits
   c) respirators
   d) medical examinations
   e) employer responsibility
   f) employee responsibility
2. Identify and describe the certification requirements of asbestos workers.

SECTION FIVE: ..... TRADE MATHEMATICS ..... 18 HOURS

A. Whole Numbers ..... 2 Hours

Outcome: ***Perform basic mathematical operations using whole numbers.***

1. Solve problems using whole numbers.

B. Fractions and Decimals ..... 4 Hours

Outcome: ***Perform basic mathematical operations using fractions and decimals.***

1. Identify key terms and concepts used in working with fractions.
2. Change fractions to a common denominator.
3. Solve problems using whole numbers and fractions.
4. Solve problems using fractions in practical applications.
5. Read and write decimals and fractions.
6. Round decimal fractions to specified place values.
7. Convert decimal inches to a fraction with a practical denominator.
8. Convert decimal feet to feet and inches with a practical denominator.
9. Convert fractions to decimals.
10. Add and subtract decimals and fractions.
11. Multiply and divide decimals and fractions.

C. Conversions and Percentages ..... 5 Hours

Outcome: ***Perform basic mathematical operations using conversions and percentages.***

1. Solve problems using:
   a) conversions
   b) percentages
   c) perimeters and areas
   d) spacing
2. Convert between fractions and percents.
3. Convert between decimals and percents.

4. Calculate ratio problems.
5. Solve percent problems.

D. Perimeters and Area ..... 3 Hours

Outcome: ***Perform basic mathematical operations for calculating perimeter and area.***

1. Identify key terms and concepts used in working with formulas.
2. Identify common formulas and solve problems for area and perimeter.

E. Band Spacing ..... 2 Hours

Outcome: ***Perform mathematical operations for calculating band spacing.***

1. Demonstrate the ability to use band spacing in math problems.

F. Board Feet ..... 2 Hours

Outcome: ***Perform mathematical operations for calculating board feet.***

1. Demonstrate ability to estimate commercial and industrial material requirements.

SECTION SIX: ..... BLUEPRINT READING AND PATTERN DEVELOPMENT ..... 18 HOURS

A. Lines, Scale Rulers, and Symbols ..... 6 Hours

Outcome: ***Identify lines, drawings, and symbols.***

1. Describe the basics of blueprint reading:
   a) lines
   b) scale rulers
   c) architectural symbols

B. Pictorial and Orthographic Drawings ..... 6 Hours

Outcome: ***Describe and perform the different types of drawings.***

1. Describe and perform the following:
   a) pictorial drawings
   b) orthographic drawings

C. Divisions of Blueprints and Print Assessment ..... 6 Hours

Outcome: ***Demonstrate the ability to assess blueprints.***

1. Identify and describe the use of divisions of blueprints.
2. Use various blueprints to enhance the understanding of blueprint reading.

SECOND PERIOD TECHNICAL TRAINING
INSULATOR TRADE
COURSE OUTLINE

UPON SUCCESSFUL COMPLETION OF THIS PROGRAM THE APPRENTICE SHOULD BE ABLE TO PERFORM THE FOLLOWING OUTCOMES AND OBJECTIVES.

SECTION ONE:..... SAFETY, NOISE CONTROL, AND EXPOSURE TO HEAT AND COLD ..... 10 HOURS

A. Safety and Noise Control ..... 8 Hours

Outcome: ***Use general safe work practices.***

1. State safety precautions for:
   a) electrical equipment
   b) cuts and abrasions
   c) elevators and hoists
   d) chemical hazards
   e) heat and cold exposure hazards
   f) high noise levels
   g) scaffolds
2. State and list general safety rules.
3. Describe special precautions used in confined areas.

B. Exposure to Heat and Cold ..... 2 Hours

Outcome: ***Demonstrate an awareness of the hazards encountered during exposures to heat and cold.***

1. Review the rules and applications of heat and cold exposure.
2. Demonstrate an awareness of heat and cold exposure.

SECTION TWO: ..... CANVAS ON PIPING, DUCTS, AND EQUIPMENT ..... 48 HOURS

A. Application and Surface Preparation ..... 13 Hours

Outcome: ***Identify applications and preparations that require canvas coverings.***

1. Outline correct preparation and application procedures for canvas on:
   a) piping
   b) duct work
   c) equipment
2. Identify and list the purposes of canvas on insulation coverings on:
   a) piping
   b) ducts
   c) equipment

B. Practical Application ..... 33 Hours

Outcome: ***Demonstrate the proper use and application of canvas on insulation.***

1. Demonstrate correct preparation and application of canvas for:
   a) piping
   b) ducts
   c) equipment
2. Demonstrate the application of canvas on insulation coverings on:
   a) piping
   b) ducts
   c) equipment

C. Stud Welders ..... 2 Hours

Outcome: ***Demonstrate the correct use of stud welders.***

1. List proper set-up and operation procedures for a stud welder.
2. Demonstrate proper operation procedures.
3. List possible problems and corrective procedures.
4. Demonstrate corrective procedures.

SECTION THREE: ..... POLY VINYL CHLORIDE PIPE COVERING ..... 20 HOURS

A. Applications ..... 6 Hours

Outcome: ***Identify applications of PVC coverings.***

1. Outline correct preparation and application procedures for PVC.

B. Surface Preparation ..... 2 Hours

Outcome: ***Demonstrate correct preparation procedures of PVC coverings.***

1. Demonstrate the correct preparation procedures when using PVC coverings.
2. Identify and perform proper cleaning procedures required prior to assembly.
3. Demonstrate the application of PVC cements and adhesives.

C. Practical Application ..... 12 Hours

Outcome: ***Demonstrate the application of PVC coverings.***

1. Demonstrate the application of PVC coverings:
   a) commercial
   b) industrial
2. Demonstrate proper procedures for joining seams using bonding agents common to the trade.

SECTION FOUR: ..... LAGS, PREFAB FITTINGS, ADHESIVES, AND MASTICS ..... 24 HOURS

A. Theory of Application ..... 8 Hours

Outcome: ***Describe the purpose and method of determining lag size.***

1. Determine lag sizes for vessels by:
   a) mathematical method
   b) drawing method
2. Determine inside lag size and the number of lags required.
3. Demonstrate the correct procedure in cutting and applying lags:
   a) hand cutting
   b) band saw
   c) table saw

B. Adhesives, Mastics, and Equipment Set-Up ..... 4 Hours

Outcome: ***Demonstrate the correct use of adhesives and mastics common to the trade.***

1. Identify various applications requiring adhesives and mastics:
   a) piping
   b) duct
   c) equipment
   d) fittings
2. Outline correct preparation and application procedures for mastic when used as a/an:
   a) sealer
   b) weather proofer
   c) vapour barrier
   d) adhesive

C. Practical Application ..... 12 Hours

Outcome: ***Demonstrate the practical application of mastics and adhesives.***

1. Demonstrate the ability to assemble prefab fittings using mastics and adhesives on:
   a) piping
   b) duct
   c) equipment
2. Demonstrate correct application procedures for mastic when used as a/an:
   a) sealer
   b) weather proofer
   c) vapour barrier
   d) adhesive
3. Outline the procedure for prefabricating tees using a jig.
4. Fabricate tees using a jig.

SECTION FIVE: .....INTRODUCTION TO METALS..... 28 HOURS

A. Line and Circle Division.....4 Hours

Outcome: ***Demonstrate the ability to apply the theoretical operations of line and circle division.***

1. Identify the methods of line and circle division.
2. Describe the methods of line and circle division.

B. Shop Equipment and Layout Tools.....6 Hours

Outcome: ***Demonstrate the correct use of shop equipment and layout tools.***

1. Identify and describe the uses of:
   a) metal layout tools
   b) metal shop equipment

C. Bevels.....6 Hours

Outcome: ***Demonstrate the practical applications of bevels.***

1. Describe basic operations/applications for bevels.
2. Demonstrate the ability to fabricate and apply bevels.

D. Equal and Unequal Tees.....6 Hours

Outcome: ***Identify and demonstrate applications of tees common to the trade.***

1. Identify and describe the uses of:
   a) equal tees
   b) unequal tees
2. Demonstrate the ability to fabricate and apply:
   a) equal tees
   b) unequal tees

E. End Caps.....6 Hours

Outcome: ***Identify and demonstrate applications requiring end caps.***

1. Identify and describe the uses of end caps.
2. Develop, cut and fabricate patterns for end caps.

SECTION SIX:.....MISCELLANEOUS APPLICATIONS..... 8 HOURS

A. Underground Systems.....2 Hours

Outcome: ***Identify and describe Insulation applications for underground systems.***

1. List the types of systems used for underground work:
   a) preformed pipe covering
   b) poured in place
   c) field applied

2. Participate in demonstration of insulating underground systems:
   a) preformed pipe covering
   b) poured in place

B. Breechings ..... 2 Hours

Outcome: ***Identify and describe applications of breechings.***

1. Outline methods and procedures for application.
2. List types of materials that can be used for breechings.
3. Outline installation methods.
4. State finishes used.

C. Expansion Joints ..... 2 Hours

Outcome: ***Identify and describe the applications of expansion joints.***

1. Describe procedures for creating expansion joints on hot applications:
   a) piping
   b) duct
   c) equipment
2. Describe procedures for creating expansion joints on cold applications:
   a) piping
   b) duct
   c) equipment

D. Fireproofing/Firestopping ..... 2 Hours

Outcome: ***Identify and describe applications of fireproofing and firestopping.***

1. List areas where the sealing of floor, wall and ceiling penetrations would be required for firestopping.
2. Identify and describe the materials and methods used in the sealing of penetrations for firestopping.
3. Identify areas where fireproofing is required.
4. Identify and describe the materials and methods used for fireproofing.

SECTION SEVEN: ..... TRADE MATHEMATICS ..... 18 HOURS

A. Trade Problems ..... 4 Hours

Outcome: ***Perform mathematical operations and calculations.***

1. Describe basic mathematical operations for:
   a) surface area of solids
   b) insulation quantities
   c) canvas quantities
   d) metal quantities

B. Insulation on Ducts and Band Spacing ..... 6 Hours

Outcome: ***Perform mathematical operations for calculating band spacing and amounts of material required for a given application.***

1. Describe basic mathematical operations for:
   a) surface area
   b) insulation quantities
   c) canvas quantities
   d) metal quantities
   e) band spacing

C. Lags ..... 4 Hours

Outcome: ***Perform mathematical operations for calculating lags.***

1. Identify and describe the calculation of lags.
2. Determine lag sizes for vessels.
3. Determine inside and outside lag sizes and calculate number of lags required.

D. Metal and Canvas on Ducts ..... 4 Hours

Outcome: ***Perform mathematical operations for calculating metal and canvas on ducts.***

1. Identify and describe the calculation methods of metal and canvas on ducts.
2. Demonstrate the ability for calculating metal and canvas on ducts.

SECTION EIGHT ..... BLUEPRINT READING AND PATTERN DEVELOPMENT ..... 24 HOURS

A. Orthographic Drawings ..... 6 Hours

Outcome: ***Demonstrate knowledge of interpreting orthographic projections.***

1. Complete exercises involving orthographic pipe and duct drawings.
2. Describe and illustrate orthographic projections regarding:
   a) top view
   b) front view
   c) right and left side
   d) plans and elevations
   e) types of special views

B. Specifications and Addendums ..... 4 Hours

Outcome: ***Identify and describe specifications and addendums.***

1. Describe the components of specifications.
2. Describe the components of addendums.

C. Commercial and Industrial Systems ..... 8 Hours

Outcome: ***Demonstrate knowledge to interpret commercial and industrial systems.***

1. Identify industrial systems requiring insulations.
2. List types of equipment commonly found in industrial systems requiring insulation.
3. Identify commercial systems requiring insulations.

4. List types of equipment commonly found in commercial systems requiring insulation.

D. Mechanical Drawings and Symbols ..... 6 Hours

Outcome: ***Demonstrate the knowledge needed to interpret mechanical drawings and symbols.***

1. Read and identify mechanical symbols on mechanical drawings.
2. Read and interpret mechanical drawings involving details and assemblies of typical structures, tanks, pressure vessels, and components for:
   a) composite steel frames and supports
   b) structural details for buildings
   c) designs of structural members and assembly of storage tanks and detailed components
   d) pressure vessels and detailed components
   e) fume ductwork and detailed components
   f) specifications

THIRD PERIOD TECHNICAL TRAINING
INSULATOR TRADE
COURSE OUTLINE

UPON SUCCESSFUL COMPLETION OF THIS PROGRAM THE APPRENTICE SHOULD BE ABLE TO PERFORM THE FOLLOWING OUTCOMES AND OBJECTIVES.

SECTION ONE: ..... SAFETY, TOOLS, AND CODES ..... 12 HOURS

A. Regulations and Building Codes ..... 4 Hours

Outcome: ***Demonstrate knowledge of applicable building codes and relevant regulations.***

1. Identify codes and regulations relevant to the Insulator trade:
   a) federal
   b) provincial
   c) municipal

B. Hand and Power Tool Use and Safety ..... 6 Hours

Outcome: ***Use general safe work practices using hand and power tools.***

1. Safely use and maintain hand tools and equipment.
2. Safely use and maintain power tools and equipment.

C. Heat Lost Detection ..... 2 Hours

Outcome: ***Identify heat loss and methods of detection.***

1. Describe the concepts of thermography.
2. Identify the principles of heat loss detection.
3. Demonstrate knowledge of heat loss detection equipment and its proper use.

SECTION TWO: ..... METAL FABRICATION ..... 12 HOURS

A. Pattern Development and Line and Circle Division ..... 4 Hours

Outcome: ***Identify and demonstrate the correct application of lines, drawings, and symbols.***

1. Draw basic geometric shapes using parallel and radial line development.
2. Define the following terms as they pertain to pattern development:
   a) parallel line development
   b) radial line development
   c) triangulation
3. Complete exercises using each method to draw various geometric shapes.

4. Draw the patterns for the following:
   a) elbow gores
   b) 45° bevel
   c) tees
   d) equal
   e) unequal
   f) cone
   g) end caps
   h) transitions
   i) square to square
   j) square to round
   k) eccentric and concentric reducers
   l) valve
   m) laterals
   n) butterfly elbow
5. Identify the methods of line and circle division.
6. Describe the methods of line and circle division.

B. Schedules of Metals, Fasteners and Pipe Sizes.....6 Hours

Outcome: ***Describe and identify the concepts of the types of metals, fasteners and pipe sizes common to the Insulator trade.***

1. List temporary methods of securing materials using:
   a) wire
   b) bands (rubber and metal)
   c) hangers and "S" clips
2. List methods of applying and securing materials using:
   a) bands and seals
   b) threaded fasteners
   c) rivets
   d) mechanical locks (metal seams)
   e) adhesives
   f) combined attachments (springs)
   g) hangers and "S" clips

C. K Factor .....2 Hours

Outcome: ***Define and calculate the K factor of insulation.***

1. Identify and list the principals of the K factor of insulation.
2. Describe the formula for calculating R factor.

SECTION THREE: .....EQUIPMENT LAYOUT..... 84 HOURS

A. Spherical and Elliptical Heads ..... 12 Hours

Outcome: ***Demonstrate the correct method of preparation and application of materials on spherical and elliptical heads.***

1. List the steps in laying out elliptical and spherical heads:
   a) chalk line
   b) mathematical
2. List the steps in applying head segments to elliptical and spherical heads.
3. Demonstrate the ability to develop, cut, form, and install elliptical and spherical head segments.

B. Box Coverings ..... 2 Hours

Outcome: ***Demonstrate correct preparation, fabrication, and application procedures of box coverings.***

1. Outline correct application procedures for insulated box covers.
2. Demonstrate ability to prefab and install box covers:
   a) permanent
   b) removable
3. Identify applications of utilidor.

C. Concentric Reducers ..... 10 Hours

Outcome: ***Demonstrate correct preparation, fabrication, and application procedures for concentric reducers.***

1. Develop patterns for flat material for a concentric reducer.
2. Layout cut and installs flat material for concentric reducers.

D. Eccentric Reducers ..... 10 Hours

Outcome: ***Demonstrate correct preparation, fabrication, and application procedures for eccentric reducers.***

1. Develop patterns for flat material for an eccentric reducer.
2. Layout cut and installs flat material for eccentric reducers.

E. Transitions ..... 50 Hours

Outcome: ***Demonstrate correct preparation, fabrication, and application procedures for transitions.***

1. Describe the importance of overlapping and sealing:
   a) waterproofing
   b) appearance
   c) expansion and contraction
   d) strength of joint or seam
   e) caulking

2. Lay out, cut and install flat material for:
   a) elbows
   b) flange type valve/strainer
   c) reducing elbow

SECTION FOUR: .....PIPE RACK LAYOUT ..... 70 HOURS

A. Bevels ..... 10 Hours

Outcome: ***Demonstrate correct preparation, fabrication, and application procedures of bevels.***

1. Describe and identify the concepts of bevel layout.
2. Demonstrate the ability to layout bevels.

B. End Caps ..... 10 Hours

Outcome: ***Demonstrate correct preparation, fabrication, and application procedures of end caps.***

1. Describe and identify the concepts of end caps.
2. Demonstrate the ability to layout end caps.

C. Equal and Unequal Tees ..... 20 Hours

Outcome: ***Demonstrate correct preparation, fabrication, and application procedures of tees.***

1. Describe and identify the concepts of equal and unequal tees.
2. Demonstrate the ability to layout equal and unequal tees.

D. Gore and Butterfly Elbows ..... 14 Hours

Outcome: ***Demonstrate correct preparation, fabrication, and application procedures of elbows common to the Insulator trade.***

1. Describe and identify the concepts of elbows:
   a) gore
   b) butterfly
2. Demonstrate the ability to layout elbows:
   a) gore
   b) butterfly

E. Laterals ..... 10 Hours

Outcome: ***Demonstrate correct preparation, fabrication, and application procedures of laterals.***

1. Describe and identify the concepts of laterals.
2. Demonstrate the ability to layout laterals.

F. Removable Covers ..... 6 Hours

Outcome: ***Demonstrate correct preparation, fabrication, and application procedures of removable covers.***

1. Outline correct application procedures for removable covers.
2. Demonstrate ability to prefab and install metal removable covers.
3. Demonstrate ability to install soft removable covers.

SECTION FIVE: ..... EXTRUDED FOAM PATTERN DEVELOPMENT ..... 14 HOURS

A. Extruded Foam Concepts ..... 2 Hours

Outcome: ***Demonstrate knowledge of extruded foam plastic.***

1. Review concept and theory of extruded foam plastic.
2. Identify applications that utilize extruded foam plastic.

B. Elbows ..... 4 Hours

Outcome: ***Demonstrate correct preparation, fabrication, and application procedures for extruded foam plastic elbows.***

1. Describe and identify the concepts of extruded foam plastic elbows:
   a) equal
   b) reducing
2. Demonstrate the ability to layout extruded foam plastic elbows:
   a) equal
   b) reducing

C. Reducers and Reducing Elbows ..... 8 Hours

Outcome: ***Demonstrate correct preparation, fabrication, and application procedures for reducers and reducing elbows.***

1. Describe and identify the concepts of extruded foam plastic:
   a) reducing elbows
   b) reducers
2. Demonstrate the ability to layout extruded foam plastic:
   a) reducing elbows
   b) reducers

SECTION SIX: ..... TRADE MATHEMATICS ..... 16 HOURS

A. Trade Problems ..... 4 Hours

Outcome: ***Perform mathematical operations and calculations.***

1. Describe basic mathematical operations for:
   a) surface area of solids
   b) insulation quantities
   c) canvas quantities
   d) metal quantities

B. Insulation on Ducts and Band Spacing ..... 4 Hours

Outcome: ***Perform mathematical operations for calculating band spacing and amounts of material required for a given application.***

1. Describe basic mathematical operations for:
   a) surface area
   b) insulation quantities
   c) canvas quantities
   d) metal quantities
   e) band spacing

C. Lags ..... 4 Hours

Outcome: ***Perform mathematical operations for calculating lags.***

1. Identify and describe the calculation of lags.
2. Determine lag sizes for vessels.
3. Determine inside and outside lag sizes and calculate number of lags required.

D. Metal and Canvas on Ducts ..... 4 Hours

Outcome: ***Perform mathematical operations for calculating metal and canvas on ducts.***

1. Identify and describe the calculation methods of metal and canvas on ducts.
2. Demonstrate the ability for calculating metal and canvas on ducts.

SECTION SEVEN: ..... BLUEPRINT READING AND PATTERN DEVELOPMENT ..... 32 HOURS

A. Blueprint Reading and Material Take-Offs ..... 6 Hours

Outcome: ***Interpret structural drawings.***

1. Complete exercises in material take-off.
2. Identify mechanical symbols used on mechanical drawings.
3. Explain the purpose of details on cross-section drawings.

B. Commercial and Industrial Systems ..... 11 Hours

Outcome: ***Read and interpret drawings.***

1. Demonstrate the ability to interpret:
   a) commercial mechanical drawings
   b) industrial mechanical and isometric drawings

C. Specifications and Addendums ..... 4 Hours

Outcome: ***Identify and describe specifications and addendums.***

1. Describe the components of specifications.
2. Describe the components of addendums.

D. Estimating ..... 11 Hours

Outcome: ***Demonstrate the ability to estimate a project.***

1. Extend insulation requirements to actual cost.
2. Demonstrate ability to interpret industrial drawings.
3. Calculate the cost of insulation given the price per unit.
4. Estimate total costs for a given project.
5. Show extra cutting and waste through poor or improper selection of materials on site.
6. Demonstrate knowledge of timelines and their development.

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